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The New World Nycteribiidae (Diptera Pupipara).

By G. F. FERRIS, Stanford University, California.

(Plate III and Text figure 1.)

The bat-infesting family Nycteribiidae, of the Diptera Pupipara, seems to be very weakly represented in the Western Hemisphere. Up to the present time but eight species have been described from North and South America together, while from the remainder of the world approximately sixty have been recorded. This disparity has been noted by Speiser and Scott, the two recent authorities upon the group, and that it actually expresses a biological condition is attested by the experience of the present writer.

Some years ago I examined the alcoholically preserved bats in the United States National Museum, going over the entire collection. The examination was quite fruitful, so much so that the resulting collection of bat parasites is probably among the largest now extant. The American bats were naturally well represented in the material examined, yet from them but three species of Nycteribiids were obtained. It became very evident

in the course of the examination that the American bats are actually much less infested, both in regard to the number of individuals as well as the number of species of parasites than are the Old World bats. The actual center of abundance seems to be in the region of the Indian Ocean, as the two authors mentioned have previously noted.

In presenting a report upon the available American material of the Nycteribiidae, I am taking advantage of the opportunity to give a resumé of the group as represented in the New World. The material upon which the report is based has come largely from the bats in the National Museum, although certain material from other sources is available. Representatives of all the species obtained from the National Museum will be deposited in the collections of that institution. The remainder of the material is in the Stanford University collection.

THE NEW WORLD GENERA.

The New World species of this family have been referred to under five generic names, *Nycteribia*, *Penicillidia*, *Cyclopodia*, *Basilisa* and *Pseudelytromyia*. Of these I am recognizing but two, *Basilisa* and *Nycteribia*. The reasons for rejecting the others will be discussed in connection with the last two genera.

These two genera may be recognized by the following key, which is based upon the work of Speiser and Scott.

1. With distinct thoracic and abdominal ctenidia; tibiae not ringed.
2. Eyes present, two-faceted.....*Basilisa*.
Eyes entirely lacking.....*Nycteribia*.

Genus *Nycteribia* Latr.

Two North American species, *N. mexicana* Bigot and *N. antrozoi* Townsend, originally described in this genus, are now referred to *Basilisa*. Two South American species, *N. flava* Weyenberg and *N. bellardii* Rondani, are retained in it, for the present at least, although in the case of the former the position is doubtful.

Nycteribia bellardii Rondani.

1878. *Nycteribia bellardii* Rondani, Ann. Mus. Civ. Genova 12:152.

1901. *Nycteribia (Acrocholidia) bellardii* Rond., Speiser, Arch. f. Naturgesch. 67 (1):46.

Records. From *Phyllostoma* sp., Brazil.

Notes: Speiser (ref. cited) has redescribed the female of this species. Its position as a member of the genus *Nycteribia* may be regarded as fairly definite.

Nycteribia flava Weyenberg.

1881. *Nycteribia flava* Weyenberg, Ann. Soc. Cientif. Argentina 11:104.

1901. *Nycteribia (Acrocholidia) flava* Wey., Speiser, Arch. f. Naturgesch. 67 (1):62.

Records. From *Vespertilio (Vesperugo) velatus*, Argentina.

Notes: Speiser has merely listed this species, apparently with doubt, under the sub-genus *Acrocholidia* of *Nycteribia*. I have not seen the description.

Genus **Basilia** Ribiero.

1903. *Basilia*, Ribiero, Archivos do Museo Nacional do Rio de Janeiro 12:175.

1907. *Pseudclytromyia*, Ribiero, *ibid.* 14:233.

1908. *Basilia*, Speiser, Zeits. f. Wiss. Ins. Biologie 13:437.

1913. *Cyclopodia*, Brethes, Bol. del Museo Nacional de Chile, pp. 1-4, figs.

The genus *Basilia* is distinguishable from *Penicillidia* only by the fact that in the former the eyes are two-faceted, while in the latter they are one-faceted. This distinction holds and may possibly be valid, although I am somewhat inclined to be dubious as to its importance. Actually *Penicillidia dufouri* (Wesw.), the type of *Penicillidia*, is not so very different from the forms referable to *Basilia* and I have, in the case of some other members of the family, seen some evidence that the character of the eyes is likely to be misleading. However, I am accepting the genus *Basilia*. On the other hand the genus *Pseudclytromyia*, as Speiser has pointed out, seems not at all worthy of separation from *Basilia*.

Brethes (ref. cited) seems to have been very much confused as to generic characters in this group, inasmuch as he placed *Basilia* as a synonym of *Cyclopodia*. There is no evidence that *Cyclopodia* occurs in the New World.

A discussion of the generic characters of the genus *Basilia*

may not be out of place and may be illustrated by reference to the figures of *B. speiseri* (Ribiero) (Plate III).

In the four species examined by me there is a rather close adherence to a certain general type. The head appears to be normally rather elongate and slender, although in some specimens it is somewhat conical, probably because of distortion. It is almost destitute of setæ except for a very few between and in front of the eyes and along the cephalic margin. The eyes are usually distinctly two-faceted, although in some specimens the facetting is somewhat obscure, possibly because of an unfavorable angle of view. The palpi are characteristically slender and tipped by a long seta and several other shorter setæ.

The thorax is in general somewhat wider than long, without any markedly distinctive characters. The thoracic ctenidia are well developed and contain numerous teeth. The legs (Pl. III, Fig. C) have the femur and tibia slightly flattened, the latter strongly haired, the setæ on the inner margin especially stout and arranged in two or three series on the apical half.

The abdomen of the female, as in all the members of the family, is difficult to describe because of the extensive membranous areas and the difficulty of homologizing the parts. After a careful comparison of the four species available I have adopted the view that there are four dorsal areas which may be homologized throughout. These four areas appear as the tergites of individual segments but that they are so is extremely doubtful. It is possible that they are really compound, being formed by the fusion of two or more segments. In order to avoid an expression of opinion as to which segments they may represent I am simply referring to them as tergites *a*, *b*, *c* and *d*. Tergite *a* (the basal tergite) varies from a very small piece in *B. speiseri* to one occupying nearly one-third of the dorsal aspect of the abdomen in *B. antrozoi*. Tergite *b* is divided by a longitudinal median suture into two lobes which may be approximate as in *B. speiseri* and *B. forcipata* or very widely separated as in *B. corynorhini*. The apices of these lobes are usually beset with long setæ but are not so in *B. corynorhini*. Tergite *c* consists of a pair of lobes separated by a median membranous area as in *B. speiseri*, *corynorhini* and

antrozoi or fused into a single piece as in *B. forcipata*. It is characteristically tipped by long setae. Tergite *d* is a part of the apical segment which bears the anus. At times this segment may be so retracted that it is scarcely visible from the dorsal aspect.

The ventral side is even more difficult to describe definitely because of the greater membranous areas. There are seven pairs of spiracles, these borne along the lateral margins and usually somewhat difficult to distinguish because of their small size and the numerous setae and tubercles. The basal sternite bears a ctenidium with as many as sixty teeth.

The male is similar to the female in the form of head and thorax, but as in all the members of the family, the abdomen is very different. There are seven very evident segments visible dorsally and there are seven pairs of spiracles but not more than five sternites can be recognized. The terminal segment is very broad and blunt and in all the species examined the forceps are long and slender. Specific characters are very poorly marked and the recognition of species from this sex when not associated with the female is very dubious. Species should not be described from the males alone.

***Basilia ferruginea* Ribiero.**

1903. *Basilia ferruginea* Ribiero, Archivos do Museo Nacional do Rio de Janeiro 12:175-9; pl. (Des. of male).

1907. *Basilia ferruginea* Rib., Ribiero, *ibid.* 14:231-2. (Des. of female).

Records. From *Vespertilio aurantcus*, Minas Geraes, and *Atalapha frantzii*, Rio de Janeiro, Brazil.

Notes: The description of the male given by Ribiero is accompanied by an excellent figure, but unfortunately that of the female is not and will scarcely permit its positive recognition. As I have pointed out this practically precludes the identification of the species.

***Basilia mexicana* (Bigot).**

1885. *Nycteribia mexicana* Bigot, Ann. Soc. Ent. France (6) 5:245.

1902. *Penicillidia mexicana* (Bigot), Speiser, Zeits. f. syst. Hym. und Dipt. 2:171-2.

Records. From undetermined host in Mexico.

Notes: Speiser (ref. cited) has redescribed the type of this species but it is very doubtful that the species can be recognized from this redescription. This author regarded the species as possibly the female of *B. antrozoi* (Townsend) but at the best this was merely a guess. I am referring it to *Basilia* simply on the basis of probabilities, although there is no information as to the character of the eyes.

***Basilia antrozoi* (Townsend).**

1893. *Nycteribia antrozoi* Townsend, Jn. N. Y. Ent. Soc. 1:79. (desc. of male).

1902. *Penicillidia mexicana* (Bigot), Speiser, Zeits. f. syst. Hym. und Dipt. 2:172.

1916. *Penicillidia antrozoi* (Townsend), Ferris. Ent. News 27:434-5; pl. 22, f. 1-2. (Desc. of male and female).

Previous records. Recorded by Townsend from *Antrozous pallidus* in New Mexico and by Ferris from *A. pallidus pacificus* in California.

Specimens Examined. Those upon which the previous record by Ferris was based and the following: from *Antrozous pallidus pacificus*, Dulzura, Calif. (U. S. N. M.) and Stanford University, Calif. (J. C. Chamberlin): *A. pallidus minor* and *Myotis californicus*, Santa Anita, Lower California, Mexico (U. S. N. M.); *Corynorhinus macrotus pallescens*, East Painted Cave, Texas (U. S. N. M.); *Nyctinomus cyuocephalus*, New Orleans, La. (U. S. N. M.).

Notes: While this species appears to be characteristically a parasite of *Antrozous*, the records given above indicate its occurrence on other hosts, unless there has been some mixing.

***Basilia corynorhini* (Ferris).**

1916. *Penicillidia corynorhini* Ferris, Ent. News 27:435-6; pl. 23, f. 3.

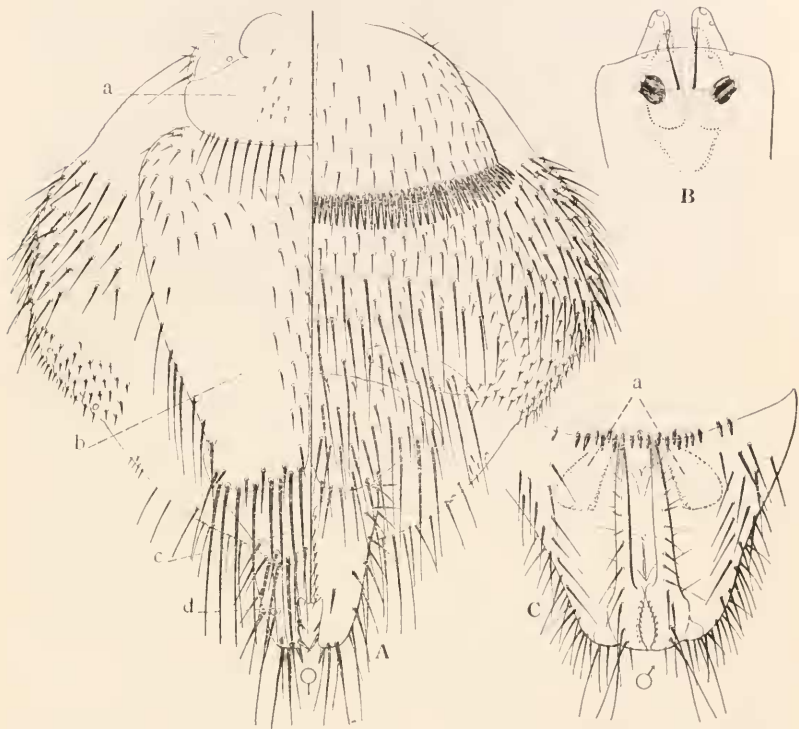
Records. Known from a single female from *Corynorhinus macrotus pallescens*.

Notes: I have nothing to add to the original description.

***Basilia forcipata* n. sp., Text-fig. 1.**

Specimens examined. Holotype (a female) and allotype and one paratype male from *Myotis californicus quercinus*, Covina, Calif. (A. B. Howell): a single female from *Nyctinomus cyuocephalus*, New Orleans, La. (U. S. N. M.): four females from *Myotis thysanodes*, Cloverdale Hills, New Mexico

(U. S. N. M.), one female from the same host at Hacienda La Parada, San Luis Potosi, Mexico and one from the same host at Old Fort Tejon, Calif. (both U. S. N. M.).



Text Fig. 1.—*Basilia forcipata* n. sp. A, abdomen of female, the left half the dorsal, the right half the ventral aspect; B, eyes; C, terminal abdominal segment of male from ventral aspect.

♀.—Length 2 mm. *Head* with the normal characters of the genus, the eyes (Fig. B) deeply pigmented and distinctly two-faceted. *Thorax* without distinctive characters.

Abdomen (Fig 1:A) with the apparent first tergite (a) quite large and with a row of setae along the posterior margin; second tergite (b) much elongate, occupying the greater part of the dorsal aspect of the abdomen, slightly narrower at the apex than at the base, divided longitudinally by a faint median suture; the surface with numerous small setae, the lateral margins with slender setae which become longer toward the apex,

the apex with a row of about eight long, stout setae on each lobe. Third tergite (*c*) quite short and broad, partially concealed by the second, with a cluster of three or four long and several smaller setae at each apical angle. Terminal segment (*d*) quite strongly chitinized, deeply divided into two rather slender lobes each of which bears three or four moderately long setae at the apex, several stout setae along the inner margin and a series of quite long setae along the outer margin.

Basal sternite occupying perhaps one-third of the length of the abdomen, beset with numerous short setae and with a ctenidium of approximately sixty teeth. The connexivum caudad of the basal sternite bears two distinct transverse rows of long setae and is thickly beset with short setae which extend somewhat to the dorsal aspect. Caudad of these setae is a pair of small, oval plates, each with a number of moderately long setae. Caudad of these is a short, broad plate with numerous slender setae and caudad of this the terminal segment.

♂.—The male is of the type common to the genus, so very closely resembling that of *B. speiseri* that it is scarcely distinguishable. It seems to be characterized chiefly by the presence on the terminal segment of a pair of internal chitinous structures (Fig. 1 *C.a*) of doubtful homology. Length 2 mm.

Basilia speiseri (Ribiero). Pl. III.

1907. *Pseudelytromyia speiseri* Ribiero, Archivos do Museo Nacional do Rio de Janeiro 1:233-5; pl. 23; pl. 24, f. 2-4.

Previous records. From *Atalapha frantzii*, Quinta de Boa Vista, Rio de Janeiro, Brazil.

Specimens examined. Eleven females and ten males from *Myotis nigricans*, Sipurio, Costa Rica (U. S. N. M.).

Notes: The description and figures given by Ribiero are sufficient to permit the reasonably certain determination of the species, but as it has been used as the type of a genus I am here figuring and describing it in somewhat more detail.

♀. (Pl. III, Fig. *A*).—With the general characters of the genus as described. Abdomen with the basal tergite (*a*) very small and inconspicuous, without setae. Second tergite (*b*) occupying about one-third of the length of the abdomen, divided by a faint median suture into two lobes, each of which bears six to eight, long, slender setae at the apex and a few slender setae along the margin. Third tergite (*c*) composed of two well separated, broad lobes which are destitute of setae except along the posterior margin where there are two or three very long and two or three short, stout setae and along the lateral margin where

there are a few slender setæ. Tergite four (*d*) short, the apices of the inconspicuous lobes with three or four stout setæ.

Basal sternite occupying nearly one-half the length of the abdomen, the ctenidium with approximately sixty teeth. Remainder of the ventral side entirely membranous. Four transverse rows of setæ of various lengths may be distinguished and the surface is sparsely beset with small, scattered setæ.

♂. (Pl. III, Fig. *B*).—The male presents no specially distinctive characters and I am unable to indicate any positive characters by which it may be separated from the male of *B. antrozoi* or, on the basis of Ribiero's figure, from the male of *B. ferruginæa*. From the male of *B. forcipata* it may be separated as indicated in the description of the latter.

Basilia silvæ (Brethes).

1913. *Cyclopodia silvæ* Brethes, Bol. del Museo Nacional de Chile, pp. 1-4, figs.

Notes: The original description of this species is not available to me. I am referring it to *Basilia* on the basis of a statement by Scott¹ to the effect that Brethes had placed *Basilia* as a synonym of *Cyclopodia*, which it certainly is not and on the basis of a strong probability that *Cyclopodia* is not represented in the New World.

The Life-History of *Mitoura loki* Skinner (Lepid.: Lycaenidae).

By KARL R. COOLIDGE, Hollywood, California.

Mitoura loki, known only from Southern California, was described from specimens taken by W. S. Wright, at Mt. Springs, San Diego County, California, July 5th, 1906, and this type locality appears to be the only habitat thus far recorded. On May 31st, 1920, I caught a worn female of *loki* in Mint Canyon, about fifty miles northeast of Los Angeles, a region very similar to that in which the species was discovered. This past season *loki* was found to be plentiful in this locality and long series were netted by local collectors.

On April 29th, I took twenty specimens, mostly fresh females. The males were more or less worn, indicating that the species had been in flight a week or more. Mint Canyon leads into

¹Scott, H. Parasitology 9: 606. (1917.)